Chapter-1

Introduction

1.1 THE PROBLEM:

Before the beginning of the industrial revolution, some two centuries ago, human activities on the average were not really incompatible with a healthy and sustainable biosphere. The vast majority of humans lived and worked on farms. Land was the primary source of wealth. Horses and other animals, supplemented by windmills, sails, and waterwheels, provided virtually all power for ploughing, milling, mining and transport. The sun, either directly or through products of photosynthesis, provided virtually all energy except in a few coal mining regions. Metals were mined and smelted (primarily by means of charcoal), but their uses were almost exclusively metallic rather than chemical. Recycling was normal. Precisely because wealth was derived exclusively from the land, Thomas Malthus worried at the end of the eighteenth century about the propensity of human population to grow exponentially, in view of the limited amount of potentially arable land available for human cultivation.

As we approach the end of the twentieth century, humans are far more numerous and also wealthier on average than they were two centuries ago when Malthus wrote. In particular, those countries that industrialized first are now comparatively rich. In the rich countries most people live in cities. Land is no longer the primary source of wealth. Energy (except food) is largely derived from the combustion of fossil fuels (coal, oil, gas). Power for machines is obtained mainly from engines driven by heat from (internal or external) combustion of fossil fuels. The
Nuclear and hydroelectric power is together account for a relatively small percentage
of the total economic affairs. However, one key attribute of this recent rise to wealth is
critical for the future of humankind: what we have achieved so far has been done by
exploiting an endowment of natural capital, especially topsoil and minerals. For some
material resources technology can offer viable substitutes. For other resources in the
natural endowment notably the biosphere and its functions has no substitute.

It is now known that sustainable industrial development requires the
preservation of the environment. Industries create a demand not only for waste
receptive services from the environmental media: air, forests, land and water but also
for some material inputs supplied by the environmental resources, for example, wood
in the paper and pulp industry. Environmental resources can ensure a sustainable
supply of these services, if they are preserved at their natural regenerative level or the
demand for waste receptive services is equal to the waste assimilative capacity of the
environmental resources. Given the demand for environmental services from various
economic activities can exceed the natural sustainable levels of supply at a given time,
and if measures are not taken to reduce this excess demand to zero then it is likely that
there can be a degradation of environmental resources. The cost of reducing the
demand for environmental services to the natural sustainable level of supply is
regarded as the cost of sustainable use of environmental resources and in the case of
industrial demand for environmental services; it is the cost of sustainable industrial
development.

As a part of environmental regulation, a firm faces a supply constraint on
environmental services in the form of prescribed standards for the effluent quality.
The effluent standards are normally fixed such that the demand for the services of environmental media does not exceed the natural sustainable level of supply. The firm has to spend some of its resources to reduce the pollution loads to meet the effluent quality standards. The firm with a resource constraint will have lesser resources left for the production of its main product after meeting the standards. Therefore, the opportunity cost of meeting these standards is in the form of a reduced output of the firm. If all the firms in the industry meet the standards, the value of the reduced output of firms is the cost of sustainable industrial development. How to estimate this cost for a competitive firm facing the environmental regulation? It has to be estimated by studying the firm’s behavior in the decision-making regarding pollution loads and the choice of pollution abatement technologies. In response to environmental regulation, firms may adopt different types of technologies to reduce pollution. Jorgenson and Wilcoxen (1990) identify three different responses of firms. First, the firm may substitute less polluting inputs for more polluting ones. Second, the firm may change the production process to reduce emissions. Third, the firm may invest in pollution-abatement devices. In practice, a firm may adopt a mix of these methods. The first two methods are non-separable with the production processes of main products while the third method is known as end-of-the-pipe method. Switching to cleaner inputs may be the least disruptive of the above three possible responses of the firm depending on the ease of substitutability of inputs. Because it does not necessarily require extensive reorganization of the production process as do the second and third responses. A high degree of substitutability between inputs implies low costs of environmental regulation and vice-versa. The second response to pollution control is the process change, which involves the redesign of production methods to reduce emissions. Such
internal process changes may have either a positive or negative effects on production of the 'good' output. For example, the internal process changes may require more input for a given level of good output, thus having a negative impact on productivity. On the other hand, it may very well also reduce the requirement of inputs, due to a more efficient production process, and then have a positive impact on productivity.

The third response to pollution control is to invest in abatement technology, i.e., in the use of special devices to treat wastes after they have been generated. According to Jorgenson and Wilcoxen (1990), end of pipe abatement is often the choice of existing firms to meet newly imposed standards. This type of investment in external treatment imposes a direct cost on the industry and thus raises the total input costs for a given level of output. The net impact of environmental regulation or pollution control on firms' production performance depends on which of the above effects dominate. Therefore, it is left to empirical analysis to establish the magnitude of the net effect in each particular case. A method of estimating cost of abatement of polluting firms should account for the cost of all three responses of firms to comply with environmental regulation.

Environmental regulation could constitute institutions of (a) Market, (b) Government, and (c) Community. A practical policy may involve all these institutions. Environmental pollution is an economic externality caused by the activities related to production and consumption of goods and services in the economy. Alternatively the waste disposal services offered by the environmental media: water, air and forests could be considered as the public goods for which markets are absent. In either interpretation, the management of environmental resources could be seen as a case of market failure and therefore it is prescribed originally for the Government to intervene
in the market process to control environmental externalities. Historically government intervention has taken the form of government ownership of environmental resource (example government taking the property rights over forests), use of direct regulatory measures (command and controls), and indirect measures like pollution taxes and permits (Pigou, 1920; Baumol, 1972; Dales, 1968). Experience shows that the government management of environmental externalities is a failure especially in the developing countries because of non-benevolent governments and resource constraints on meeting the high transaction cost of designing and implementing these instruments. Alternative institutions to control environmental externalities in which government plays a minimal role have developed drawing mainly from Coase’s seminal contribution (Coase, 1960). Empirical experience in developing countries shows that where government regulation (formal regulation) is weak or absent, regulation by people’s participation or local communities (informal regulation) has resulted in the control of environmental externalities like industrial pollution or forest degradation (Murty et al. 1999; World Bank, 1999). There is also now some evidence to suggest that market agents: producers, consumers, local communities, and government have incentives to voluntarily work for the reduction of environmental externalities. This phenomenon is called a new model of pollution control (World Bank, 1999).

India’s “New Economic Policy” was introduced in 1991; advances were made in modernization and industrialisation. India has wide industrial base and almost all types of manufacturing industries are existing or being set up. The pace of industrialisation has been accelerated with the recent liberalization programmes in the country and has been stimulated by the entry of well known multinationals and foreign capital. The controls are gradually being relaxed with continuous reforms in
duties, taxes and administrative structure. However, the development of infrastructure has not picked up with the same pace as industrialization and is proving to be a bottleneck. The Government of India is paying a lot of attention to attract private investment in this vital sector. About 7500 large scale and a very large number of small and medium enterprises (SME's) are operational in India. The large scale enterprises are more or less compatible with industries anywhere else. However, SME's have special characteristics and deserve elaborate explanation. The Small and Medium Scale Industries form the backbone of Indian economy. There are 3 Million SMEs in the country as against a mere 2000 industries in the large scale sector. The SMEs spread over an area of 3.28 million sq. km account for over 40% of the industrial production and 30% of the country's export. These SMEs also contribute towards more than 65% of the industrial waste generated within the country. This waste not only results in a loss of precious raw materials but also degrades the environment.

Environmental pollution is one of the serious problems faced by the people in the country. Rapid population growth, industrialization and urbanization in country are adversely affecting the environment. Though the relationship is complex, population size and growth tend to expand and accelerate these human impacts on the environment. All these in turn lead to an increase in the pollution levels. However, environmental pollution not only leads to deteriorating environmental conditions but also have adverse effects on the health of people. India is one of the most degraded environment countries in the world and it is paying heavy health and economic price for it.

In India, Environmental problems and issues received special attention of the Government of India during the beginning of the Fourth Five Year Plan (April,
1969 to March 31, 1974). As a follow-up step, a National Committee of Environmental Planning and Co-ordination (NCEPC) was set up in 1972 under the Department of Science and Technology. A separate Empowered Committee was set up in 1980 for reviewing the existing legislative measures and administrative machinery for ensuring environmental protection and for recommending ways to strengthen them. On the recommendations of this Empowered Committee, a separate Department of Environment was set up in 1980 which was subsequently upgraded to a full-fledged Ministry of Environment and Forests in 1985 to serve as the focal point in the administrative structure of the Government of India for the planning, promotion and co-ordination of environmental and forestry programmes. The State departments of environment, Central and State Pollution Control Boards, the Botanical and Zoological Survey of India, the Forest Survey of India, the National River Conservation Authority (formerly Central Ganga Authority), the National Afforestation and Eco-development Board, the Indian Council for Forestry Research and Education, the Wildlife Institute of India, the National Museum for Natural History, etc., are the Ministry’s partners in carrying out environmental protection activities.

In India, striking environmental balance with economic growth is a subject of state policy. Since 1974, various environmental laws have been enacted and numerous institutions have been set up to implement the objectives of these laws. But this traditional form of governance – enacting a law and then setting up a bureaucracy to implement it – has failed to reduce industrial pollution in India. Monitoring mechanisms are often not effective because of poor availability of financial and human resources. Enforcement mechanisms also lack teeth. Part of the
reason is also that government agencies have failed to inform the public in a way that there is a constant debate on ways to reconcile difficult contradictions between environment and development and thus, unleash an energy that would overtake the current inertia.

Although India has had relatively stringent environmental regulations for the past 10-15 years, the country continues to encounter enormous environmental problems, many of these as a result of industrial activity. For this, industry regulations to reduce pollution have been in place since 1986, but measurements of the effluent from the industry still show that the concentrations of chemicals and organic matter are too high. What can explain this lack of conformity between regulations and reality? To address this question, three research questions were formulated that are:

1. How the environmental regulations for the industry have changed the environmental performance of the industries involved in such activity?
2. What can explain the variation in compliance between firms?
3. What needs to be done to improve compliance with environmental regulations?

1.2 REVIEW OF LITERATURE:

It pertains to study of referential matters related to problem of the study. It is elaborated as separate chapter (i.e. chapter-2) under the scheme of the study.
1.3 OBJECTIVES OF STUDY:

The study primarily aims at probing the nature and magnitude of environmental pollution generated by industrialisation and suggests appropriate remedial measures for pollution abatement. The specific objectives of the study are:

1. To identify the pollutants due to various activities in the industry clusters and develop a pollution profile;
2. To probe the factors that influences the current level of pollution;
3. To identify appropriate abatement measures related to these factors to reduce the environmental pollution;
4. To determine the costs and benefits of pollution abatement measures;
5. To develop a policy framework to promote environment friendly industrialization;
6. To aid in better formulation of policies by the government leading to sustainable development of Indian industries.

1.4 SCOPE OF THE STUDY:

The problem of environmental pollution is likely to be more acute in large scale industries, medium scale industries and small scale industries which are listed in 'Red Category' by Central Pollution Control Board. Traditional Small Scale Industries clusters are by nature more polluting due to various factors such as technological obsolescence, lack of awareness among entrepreneurs about better alternatives, higher composition of unskilled labour force, etc. Therefore, study is confined to those industries which are listed as 'Red Category' in all categories of industries. In Indian context, those industries listed as 'Red Category' are given below
I would also like to bring it to attention that the study focuses mainly on air and water pollution generated by a very few industries included in the ‘Red Category’ (i.e. 17 highly polluting industries) of industry.

1.5 DATA SOURCES AND METHODOLOGY USED:

The study is exclusively based on the secondary data. The relevant data have been collected from the various sources such as industrial reports, Government gazettes, published books, reports, research papers and various journals etc. The descriptive and content analysis methods of research methodology have been used in the study. In this context, statistical tools such as standard deviation, Minimum and
Maximum Values, Average or Mean, Growth rates and Graphs have been used for analyzing the available relevant data.

1.6 LIMITATIONS OF THE STUDY:

The database on industrial pollution, especially lethal and toxic pollution emissions are extremely scarce in India. There is serious doubt about both the completeness and the accuracy of the governmental and institutional reports because published data are very difficult to reconcile with materials balance estimates. In India, the published data on environmental quality are very limited and sketchy. The limited data gathered by government bodies do not have adequate coverage in terms of time or space. Since these data are generally collected as part of a department's routine programme for some specific purposes. It is really a difficult task to make exact and tacit inferences and generalize it.